especially in patients with acute onset of MR without annulus enlargement.

References

1. Salvador L, Mirone S, Bianchini R, et al. A 20-year experience with mitral valve repair with artificial chordae in 608 patients. *J Thorac Cardiovasc Surg*. 2008;135:1280-7.
2. Gilinov M, Banbury KM. Pre-measured artificial chordae for mitral valve repair. *Ann Thorac Surg*. 2007;84:2127-9.
3. Baufreton C, Laporte J, Langlais J, Mehreb M, Binuani P, De Brux JL. Transesophageal echocardiography-guided chordal replacement for tricuspid regurgitation. *Ann Thorac Surg*. 2004;77:1811-3.
4. Fattouch K, Sampognaro R, Bianco G, et al. Implantation of Gore-Tex chordae on aortic valve leaflet to treat prolapse using ''the chordae technique'': surgical aspects and clinical results. *Ann Thorac Surg*. 2008;85:2019-24.
5. Konings TC, Koolbergen DR, Bouma BJ, et al. Iatrogenic perforation of the posterior mitral valve leaflet: a rare complication of pacemaker lead placement. *J Am Soc Echocardiogr*. 2008;21:512.e5-e7.

An improved hemostatic aortic anastomotic technique for nondissected aortic aneurysms

Robert Saeid Farivar, MD, PhD,[a] and Lawrence H. Cohn, MD,[b] Iowa City, Iowa, and Boston, Mass

Various anastomotic options have been described for securing native aortic tissue to synthetic graft material.[1,2] Solutions such as a running Prolene suture (Ethicon, Inc, Somerville, NJ) without felt or bioadhesives have the advantages of being simple and rapid but might suffer from loosening during the creation of the anastomosis. A doubled felt anastomosis with or without glue is very secure and hemostatic but cumbersome to create and leaves an excess amount of foreign material that might elicit an inflammatory reaction[3] or cause late problems at the anastomosis. Automatic staplers have been developed but have not had widespread clinical use, partially because of potential problems in atherosclerotic vessels, initial costs, and lack of long-term follow-up.[4]

CLINICAL SUMMARY

We have developed an anastomotic technique that is inexpensive, hemostatic, and minimizes the use of extraneous materials for nondissected aortic tissue. In our technique we use 2 additional sutures to lock an inverting anastomosis in each posterior quadrant.

For both proximal and distal ascending aortic graft anastomoses, a 3-0 pledgeted Prolene suture (4-0 for patients with Marfan syndrome) is used as a horizontal mattress in the posterior base of the graft and then taken through the native aorta (Figure 1, *A*) and tied. (The pledget can also be placed inside the aorta and does not affect the technique.) The suture is then run in an inverting manner to the midpoint on each lateral aspect of the graft (3-o'clock and 9-o'clock positions, if the 12-o'clock position is most ventral on the aorta; Figure 1, *B*), with care taken by the assistant to provide traction while minimizing aortic intimal laceration. At this point, an additional simple 3-0 suture is placed outside-in directly below (dorsal) the exiting point of the original suture (Figure 1, *B*) and knotted with 4 half-hitches, secured to the original suture, and cut (Figure 1, *C*). This maneuver locks that section of the posterior anastomosis, limiting maximal tension without loosening the suture line. At this point, the additional suture is run to the 12-o'clock position (Figure 1, *D* and *E*). The same procedure is duplicated on the other side of the graft and tied at the 12-o'clock position (Figure 1, *F*). In this way each quadrant of the graft is locked into place, minimizing the loosening of the suture line and thus minimizing the potential for bleeding. Of course, if a felt pledget is used on the outside of the aorta, this suture technique can still be used to prevent loosening of the suture line.

DISCUSSION

For the last 50 consecutive elective aortic graft cases using this technique, we have not used any felt other than the initial pledget. There have been no reoperations for bleeding and no mortality, and blood products were used in only 8 of 50 patients: 3 patients with fresh frozen plasma and platelets and 5 patients with only exogenous blood averaging 2 units per patient. This inverting anastomotic technique produces no gradient at the anastomosis, as evaluated by using transesophageal echocardiographic analysis. We conclude that it is an easily learned and easily taught technique that results in a hemostatic suture line that can be performed rapidly in the elective aortic aneurysm setting. We have used this most

From the Department of Cardiothoracic Surgery,[a] University of Iowa Hospitals and Clinics, Carver College of Medicine, University of Iowa Heart and Vascular Center, Iowa City, Iowa, and the Division of Cardiac Surgery,[b] Harvard Medical School, Brigham & Women's Hospital, Boston, Mass.

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Address for reprints: Robert Saeid Farivar, MD, PhD, Department of Cardiothoracic Surgery, University of Iowa Hospitals and Clinics, Carver College of Medicine, University of Iowa Heart and Vascular Center, 200 Hawkins Dr, SE 517GH, Iowa City, IA 52242-1062 (E-mail: robert-farivar@uiowa.edu).

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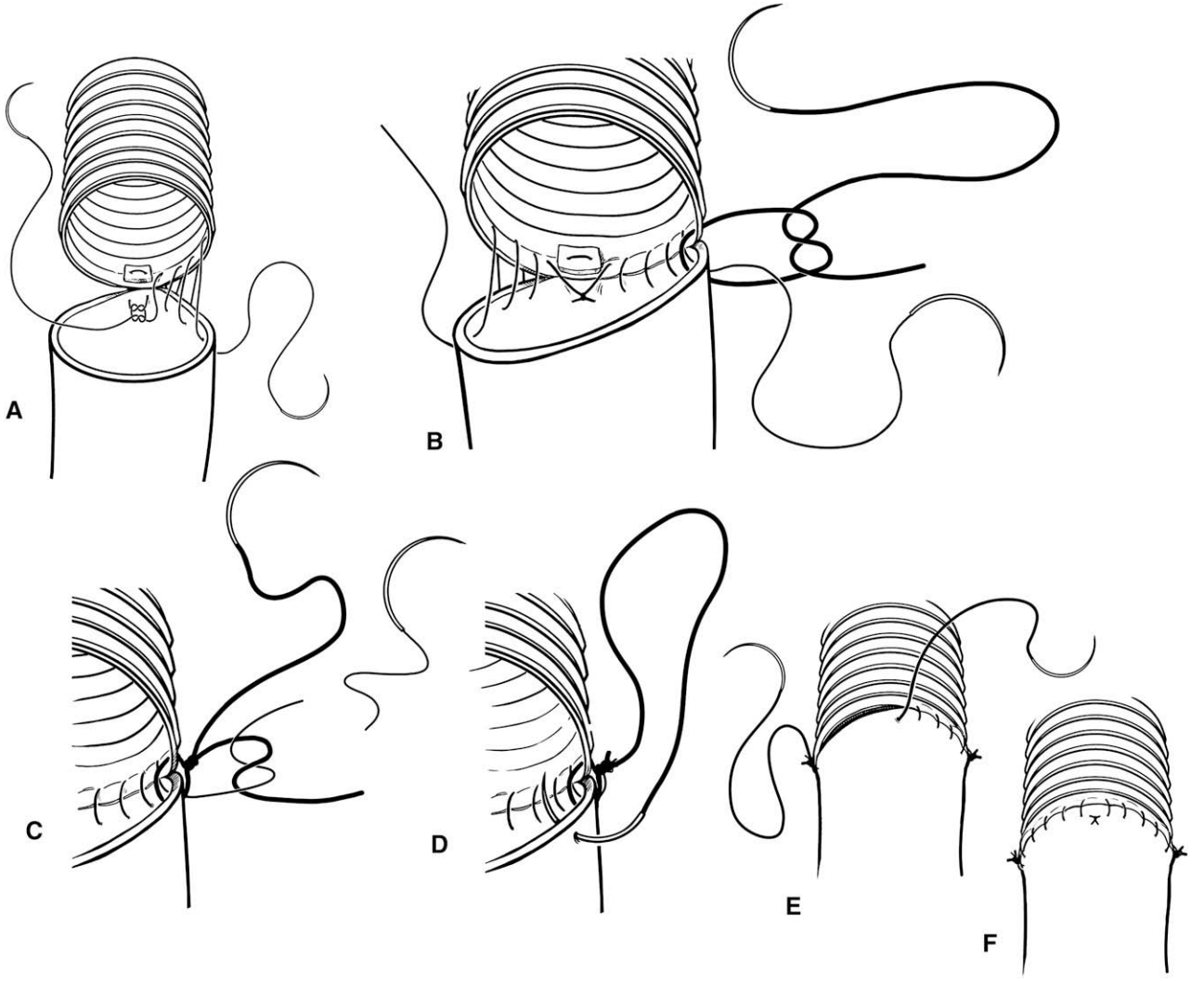

FIGURE 1. A, A pledgeted double-arm suture is taken through the graft and native aorta and secured with 4 half-hitches. It is then run one quarter of the anastomosis. B, The suture is then locked with an additional suture that is placed immediately dorsal and outside-in on the graft and secured. C, The original suture is cut. D and E, The new suture is then run to the most ventral part of the anastomosis. F, The same is performed on the mirroring side of the anastomosis and secured.

often in the anterior mediastinum, but it is applicable to every other portion of aorta.

References

1. Bavaria JE, Pochettino A, Brinster DR, Gorman RC, McGarvey ML, Gorman JH, et al. New paradigms and improved results for the surgical treatment of acute type A dissection. *Ann Surg*. 2001;234:336-43.
2. Griepp RB, Stinson EB, Hollingsworth JF, Buehler D. Prosthetic replacement of the aortic arch. *J Thorac Cardiovasc Surg*. 1975;70:1051-63.
3. Sokullu O, Sanioglu S, Orhan G, Kut MS, Hastaoglu O, Karaca P, et al. New use of Teflon to reduce bleeding in modified Bentall operation. *Tex Heart Inst J*. 2008;35: 147-51.
4. Masuda S, Saiki Y, Kawatsu S, Yoshioka I, Fujiwara H, Kawamoto S, et al. Trial of new vascular clips for aortic anastomosis in a canine model. *J Thorac Cardiovasc Surg*. 2007;134:723-30.